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BOTANICAL RESOURCES OF THE HASTINGS RESERVATION, MONTEREY COUNTY, CALIFORNIA

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The Hastings Natural History Reservation is managed by the Museum of Vertebrate Zoology, University of California, Berkeley, and is part of the University's Natural Land and Water Reserve System. The reserve's botanical value lies not in its vegetational uniqueness but in its representative samples of south Coast Range vegetation types. The reserve furnishes good examples of foothill plant communities intermediate between coastal and Central Valley conditions. This note outlines the botanical resources of the Hastings Reservation and announces the availability of a plant list for the reserve.

Historical Setting

Little is known of aboriginal influences on vegetation within the reserve. Small groups of Esselen Indians must have visited the region over extensive periods, for at one small campsite on the reserve they created an organic soil 125 cm deep. The Esselens probably used the area for seasonal hunting and acorn gathering. Cattle grazing from the nearest Mexican land grant, Los Tularcitos Rancho, may have affected the reserve after 1834. The initial input of Mediterranean annuals must stem from that era. Theodor Hartweg, collecting for the London Horticultural Society, probably crossed the reserve in 1846. His Carmel Valley notes include comments on lower slopes "thinly covered with oaks" and grassland "thickly covered with wild oats". American homesteaders settled

within the reserve boundaries by 1863. They cleared oaks locally for firewood and fence posts. These ranchers cultivated patches of grassland and savanna as hayfields. Sizeable portions of the reserve, however, had no gross disturbance other than grazing. In 1877 the General Land Office surveyed the area, and their map shows boundaries of some hayfields and chaparral patches. Livestock numbers and general ranching activity may have peaked around 1900.

Through the generosity of Frances S. Hastings, the Museum of Vertebrate Zoology, University of California, Berkeley, assumed control of the reserve in 1937. At that time grazing and cultivation on the former ranch ceased. The Museum's resident zoologists started intensive plant collecting. They also accumulated many plant ecological and distributional notes. A plant list based on over 3,000 specimens in the reserve herbarium was published (J. Linsdale, Leafl. W. Bot. 7:201–218. 1955). Visiting specialists frequently worked on systematic and cytogenetic problems of selected plants. During this period a solid base of environmental data was also gathered. Standard temperature and precipitation records are available back to 1939. Geology and soil maps were prepared. Many vegetation photographs, now over 30 years old, were taken.

In 1962 the Museum provided for a resident plant ecologist. Since then, further plant collecting has cleared up many loose ends in floristic records on the reserve. Permanent vegetation plots were established, and a variety of ecological studies were started.

Plant Communities

Mixed Evergreen Forest. This is the most extensive community on the reserve. It is dominated by sprouting hardwood trees, particularly oaks. At Hastings very few conifers are present in the mixture. The reserve has as good a selection of age-classes as is available in any comparable south Coast Range forest. There are three obvious local dominance phases in this low elevation forest:

Oak-madrone—open, mixed stands of *Quercus agrifolia, Arbutus menziesii, Q. kelloggii,* and other trees; well developed on the middle of long north slopes.

Coast live oak—dense stands dominated by *Quercus agrifolia,* common on lower slopes; on valley bottoms this phase becomes more open and *Q. lobata* assumes co-dominance.

Canyon live oak—dense stands dominated by *Quercus chrysolepis,* may have colonies of *Umbellularia californica;* weakly developed on north slopes and steep ravines.

Foothill Woodland. This is a well developed deciduous oak community on ridgetops and southern aspects. Stands are open with significant herbaceous cover under and between trees. *Quercus douglasii* and *Q. lobata* occur separately in pure stands and also in mixtures. These woodland or savanna stands often form transitions between Oak-madrone forest and grassland.

Riparian Woodland. Streamside communities are poorly developed on the reserve and have declined in recent decades. *Platanus racemosa* occurs along all watercourses. On open creek bottoms willows are common with clumps of *Ribes, Rosa,* and *Rubus.* Steep shady sections have scattered *Acer macrophyllum* and *Alnus rhombifolia* populations. The largest creek on the reserve is seldom perennial now. Portions of a smaller creek have some pools throughout the driest seasons and support some marsh species.

Chaparral. Adenostoma fasciculatum shrubs dominate south aspects, particularly steep mid-slope areas with shallow soils. *Ceanothus ramulosus* may be locally conspicuous, and colonies of extremely variable *Arctostaphylos glandulosa* are scattered about. Well developed communities of coastal sage scrub are absent from the reserve, but scraps of this low-shrub community border the lower margins of the chaparral. Much of the chaparral may not have burned for almost a century; small tracts burned in 1937 and 1955.

Grassland. Openings in the savanna form much of the "grassland" on the reserve. The largest naturally treeless tract is on a steep, rocky, clay soil from basalt. *Stipa pulchra* is widely distributed in the grassland, both in uncultivated areas and old-fields. This bunchgrass becomes most conspicuous in swales with deep clay soils or on some rocky ridges. Grassland species diversity is high. Many 0.1 ha plots have more than 50 species present; one plot in 1973 had 77 species present. *Bromus mollis* and *Avena fatua* are the most important annual grasses in the least disturbed parts of the grassland.

Floristics

Vascular Plants. Since 1937, the approximate numbers of taxa collected on the 780 ha of the reserve are:

Families	77
Genera	296
Native species	465
Introduced species	127
Inter-"generic" hybrids	4
Inter-"specific" hybrids	8

Only 26 additional species have been found since compilation of the 1955 plant list.

Diversity within families and genera follows expected patterns. There are 50 genera of Compositae and 30 genera of Gramineae. Legumes are conspicuous in the grassland with 15 *Trifolium,* 9 *Lupinus,* and 7 *Lotus* species. The most diverse shrub genus is *Ribes* with 6 gooseberry and 2 currant species. The most important tree genus is *Quercus* with 6 species and 4 formally described hybrids.

Only one Santa Lucia Range endemic is present on the reserve, *Ribes*

sericeum. Several Santa Lucia-Gabilan Range endemics are present: *Clarkia bottae, Eriastrum virgatum, Eriogonum nortonii,* and *Mimulus bifidus* ssp. *fasciculatus*.

A few of the "native" species are probably not native locally and have reached the reserve recently. The high number of exotics (21 percent) includes 44 weeds and domestic species that disappeared from the gardens and fields a few years after farming stopped. In both uncultivated grassland and old-fields about 35 percent of the species now present introduced. It seems unlikely that many of these exotics will disappear from the grassland in the foreseeable future. One species that has either been recently introduced or else has made a dramatic recent expansion is *Draba verna*. A small population of *Bromus tectorum* discovered in 1971 has remained stable.

Non-vascular Plants. Although there have been spurts of collecting of various lower plant groups, they have received far less attention than vascular plants. Except for lichens, few specimens have been added in the last 20 years, and the names have not been checked recently. Most of the determinations for mosses were by L. F. Koch in 1951, for liverworts by A. Carter between 1941–44, and for lichens by A. W. Herre between 1941–42. Approximate numbers of taxa collected on the reserve in these groups are:

	families	genera	species
Mosses	21	46	82
Liverworts	10	10	16
Lichens	22	42	160

Interest in fungi has been rather spotty. Some 250 species have been identified, not counting the lichens. Lee Bonar collected on the reserve in the 1940's. He determined most of the specimens in the collection and described two new species from reserve material. Bonar also compiled a list of 145 fungi causing plant diseases on the reserve. Hypogaeous fungi were given special attention since they are an important rodent food. Helen Gilkey worked on the Tuberales and described two new species.

Plant List Availability

A complete plant list and bibliography may be obtained from the Hastings Reservation, Star Route Box 80, Carmel Valley, California 93924. This list contains additional environmental data, vegetation descriptions, and detailed annotations on all vascular plants.

The real resources at Hastings are not the specimens but the plants and communities available for study under relatively undisturbed conditions. Anyone wishing to use these natural area facilities for research or class purposes should contact the same address listed above.